AN ESSAY

ON

WOUNDS OF THE INTESTINES.

BY THOMAS SMITH,

OF THE ISLAND OF ST. CROIX,

HONORARY MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY.

.....ut si
Cæcus iter monstrare velit.....HOR.

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AN

INAUGURAL ESSAY,

FOR

THE DEGREE

OF

DOCTOR OF MEDICINE.

SUBMITTED

TO THE EXAMINATION

OF THE

REV. J. ANDREWS, D.D. PROVOST,

(PRO TEMPORE).

THE

TRUSTEES, AND MEDICAL PROFESSORS

OF THE

UNIVERSITY OF PENNSYLVANIA,

ON THE FIFTH DAY OF JUNE, 1805.

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TO WILLIAM SMITH, ESQUIRE,

OF THE

ISLAND OF ST. CROIX;

AS A TRIBUTE

OF

GRATITUDE AND RESPECT,

THE FOLLOWING PAGES ARE DEDICATED,

BY HIS AFFECTIONATE SON,

THOMAS SMITH.

TO CASPAR WISTAR, M. D.

ADJUNCT PROFESSOR

OF

ANATOMY, SURGERY, AND MIDWIFERY,

IN THE

UNIVERSITY OF PENNSYLVANIA,

THIS ESSAY

IS INSCRIBED

AS THE GENUINE TRIBUTE OF

RESPECT, ESTEEM, AND GRATITUDE,

FROM AN OBLIGED, AND

AFFECTIONATE PUPIL,

THOMAS SMITH.

To

M^r Russell with the compliments

of the Author

TO DR. JOHN RUAN,

OF

FRANKFORD, PENNSYLVANIA.

DEAR SIR,

Be pleased to accept of this imperfect Essay as a mark of the respect, which I entertain for your talents, as a Physician, and for the many obligations and polite attention conferred on me by your family, during my residence in this country; and be assured it will always be remembered with gratitude and esteem,

By your affectionate friend,

THOMAS SMITH.

INTRODUCTION.

IT is proposed in the following pages to take a brief view of the different methods which have been recommended for treating wounds of the intestines, to describe certain experiments, on brute animals which were made to ascertain the method most likely to prove successful, and to offer some doubts relative to the common opinions on this subject. I do not intend to enter minutely into the general mode of treating wounds of the intestines, but to confine myself entirely to the best manner of stitching them. Perhaps there are few accidents, to which surgeons are called, where they find themselves more at a loss how to proceed, than in wounds of the intestines. These circumstances, as well as the frequent fatality of such injuries, evince the great importance of the subject. It is well known

to surgeons, that the most trifling puncture, made into the cavity of the abdomen, is apt to induce very serious consequences, from the tendency which the peritonæum has to inflame, when slightly injured; how much must the danger be increased when an intestine is wounded, and an opening produced, through which its contents may pass into the cavity of the abdomen. We are, however, told by a celebrated author,* that there is very little to be apprehended from this circumstance, on account of the equable pressure which is always kept up in the abdomen by the viscera. But I hope to prove from experiment, that his ideas were not altogether correct on that subject. The invaluable work on hernia, of Mr. Astley Cooper, gave rise to this essay, and the ingenious observations of Messrs. Cooper and Thompson, respecting the difference between the consequences of longitudinal and transverse wounds of the intestines, induced me to attend particularly to that part of the subject.

AN INAUGURAL ESSAY.

WOUNDS of the intestines may be known by a passage of blood from the mouth and anus, as well as by the discharge of fœces and fætid air from the external wound, and they ought to be suspected, when nausea, vomiting, violent griping, pains through the abdomen, cold sweats or faintings occur after, penetrating wounds of that cavity. The intestines are sometimes wounded without protruding through the external wound: in such cases it would be of very little advantage to know, whether the wound was transverse or oblique; for the method to be pursued must be similar to that in simple penetrating wounds of the abdomen, viz. blood-letting and a low diet. Some authors recommend dilating the external wound, and searching for the injured bowel; but the danger arising from

penetrating wounds in the abdomen, of all sizes, is so great, that in no instance ought it to be attempted, as there are cases on record of persons recovering from a wounded bowel, without having been under surgical treatment. It is, therefore, only in cases, where the wounded intestine is protruded that the suture can be properly applied. The different kinds of sutures which have been recommended, have all had their advocates; the most ancient, and that which appears to have been most generally used is termed the glovers suture, which I shall now take the liberty of describing. In making this suture, a fine small round needle should be used armed with a silk thread, which has been previously waxed. The surgeon bringing the lips of the wound in contact, perforates both edges at the same time, and carrying the needle to the same side at which it entered, he must make a second stitch, at a small distance from the first, perhaps the eighth of an inch, and in the same manner by a proper number of stitches, must close the wound throughout its whole extent. This being done, a sufficient length of thread is left out at the external wound for the purpose of drawing it away, when we suppose the wound of the

intestine to be united, which is generally completed in six or seven days: in withdrawing the ligature care should be taken to do it very gently, least we should destroy the adhesions which have taken place. This mode of stitching a wounded intestine, is certainly a very complicated process, and should be dispensed with in every instance for a more simple one.

A more modern method has been spoken of by Mr. Ledran, which is termed the looped suture. To make this suture, an assistant takes hold of one end of the wound whilst the surgeon does the same with the other, and the needles, which should be round, straight, and small, carrying each of them a thread a foot long, and not waxed, must be equal in number, to the stitches intended to be made: as many threads are now to be passed through both lips of the wound as are thought necessary, taking care that they are a quarter of an inch distant from each other. All the threads being passed, the needles are to be withdrawn, and the ends of the threads on each side are tied, after which, joining them together they are twisted into a sort of cord: by this means, the divided portions of in-

testine are drawn into pleats, so that the stitches which were distant about a quarter of an inch are now brought together, and thus the lips of the wound are prevented from separating. The ligatures are to be fastened to the external dressing, afterwards they remain until the wound in the intestine is healed; they are then to be untwisted, and all the ends cut off on one side; after which they must be withdrawn slowly and separately. The same objection may be applied here as in the glovers suture, this is certainly a more complicated process, and it increases the danger of the operation, by lessening the diameter of the intestine, thereby occasioning dangerous obstructions.

Mr. John Bell, has recommended in wounds of the intestine, that we should only use one single stitch, which should be passed through the wounded bowel, and then drawn through the integuments of the abdomen at the external wound. But notwithstanding what Mr. Bell has said, of the equable pressure which is kept up among the viscera, preventing the fœces from being shed into the cavity of the abdomen; I must, however, beg leave to differ from him, for in

the experiments which I performed, I found that treating the intestine in this manner was not sufficiently secure for preventing the fœces from escaping into the abdominal cavity.

The following suture has also been proposed in a complete division of the intestine.* It was first recommended by Mr. Ramdhor in cases of hernia, where a portion of the intestine had been destroyed by mortification....In these cases, he has advised *to extirpate the diseased part*, and to introduce the upper portion of the sound intestine within the lower, for about an inch, and to confine it there by sewing it once or twice round with a fine needle and thread; but besides the difficulty of knowing which is the upper or lower portion in wounds of the intestines. I find that it never can be performed on the living subject, as will appear by the ninth experiment, for immediately upon making the section of the intestine, the divided parts became so much inverted, as to render the introduction of one within the other utterly impossible. The method which appears to promise most success, is that recom-

* Mr. Benjamin Bell speaks highly of it in his System of Surgery

mended by Mr. Astley Cooper, in his work on hernia, in that part wherein he treats particularly of mortification of the intestine. He directs, that the injured part should be removed, and the divided portions brought into contact, and secured by four stitches, one being at or near the mesentery, and the others at equal distances from each other.

This method is certainly the most safe and simple of any that has yet been spoken of, and will no doubt in time be generally adopted. Perhaps four or five stitches will be found sufficient in most instances of a complete division of the intestine. But we should be careful not to use more than are really necessary, for it has been observed, that puncturing the intestine frequently increases the danger of the operation very much.

In order to decide between these different methods, I determined to institute a series of experiments upon dogs by wounding their intestines, and uniting them with the various sutures above stated. I am aware, that it is not easy to determine with precision the treatment

proper for the human species, by inferences derived from the dog; but the analogy in the present instance appears to me very strong. I shall in the next place commence, by relating my experiments.

EXPERIMENT I.

APRIL 7.

ASSISTED by my friend Mr. Klapp, an incision was made into the abdomen of a dog, and one of the small intestines; having been brought into view, a transverse section was made into it, and the wound secured by four stitches, one at the mesentery, and the other three at equal distances from each other, the threads were then cut off at the knots, and the external wound closed by the interrupted suture.* The animal did not appear to have suffered materially from the operation, for in twenty four hours he took food, and after the first day exhibited no symptoms of indisposition. On the 30th, he was kil-

* The interrupted suture was used in every instance, for securing the external wound, unless particularly mentioned.

led, the wound of the intestine was found completely healed; the place at which the intestine had been divided, appeared somewhat thickened, considerable adhesions were observed among the small intestines. Three of the ligatures had disappeared, the other was still remaining loosely attached to the internal coat, and probably would have been discharged in the same manner as the others, had the dog been permitted to live a few days longer.

EXPERIMENT II.

APRIL 7.

ON another dog, I repeated the same operation, with this difference, that the ligatures which had been cut off in the preceding experiment at the intestine, were now left out at the external wound, in case it should be necessary to withdraw them. In consequence of the restlessness of the animal during the operation, considerable violence was done to the parts, before they could be reduced. On the second day after the operation, the dog appeared so ill as to make his recovery doubtful: On the 4th day,

it was thought proper to remove the ligatures; after this he appeared better and took nourishment. On the 19th, he was killed: upon laying open the abdomen, the effects of inflammation were still obvious. The omentum was found adhering to the parietes of the abdomen, and very much indurated. Preternatural adhesions had taken place among all the viscera, but more particularly in the small intestines, which were knotted and twisted together in an astonishing manner. The intestine at the place where the wound had been made was not quite united.

EXPERIMENT III.

APRIL 9.

SEVERAL of my friends honoured me with their attendance, whilst the following experiments were performed; the abdomen of a dog having been opened, and the small intestines brought into view, a longitudinal incision of about an inch and a half was made parallel with the mesentery, which was secured by four stitches, and the intermediate spaces sewn with a fine thread to prevent the fæces from escaping into the

cavity of the abdomen :* the threads were cut off at the intestine. The animal died in about thirty six hours. On dissection the marks of inflammation were found much less than might have been expected.

The wound in the intestine was completely torn open, excepting at one stitch.

EXPERIMENT IV.

APRIL 9.

A FULL grown dog was submitted to the same experiment as the former with this difference, that the intermediate spaces between each stitch were left unsewn. Six hours after the operation, the animal vomited stercoraceous matter, appeared dull and drowsy. On the 10th, in consequence of food being offered, of which he took a small quantity, vomiting was again excited. On the 12th, he took food, and from that time appeared to be doing well. Seven days after he was killed; on opening the abdomen the omentum was found adhering to the site of the ex-

* According to the proposal of Thompson of Edinburg.

ternal wound, being confiderably indurated. The mesenteric glands were enlarged. The wound in the intestine was not completely united, two of the ligatures had disappeared. The other two still remained; the wounded gut had adhered to the mesentery and adjoining portion of intestine.

EXPERIMENT V.

APRIL 10.

ON a full grown tarrier, I repeated the former experiment wishing to see, whether a longitudinal incision could not by great care and attention, be so managed, as to do away the opinion of its being universally fatal. To effect which, a very small opening was made through the parietes of the abdomen, and a portion of intestine, being brought into view, it was divided longitudinally for about two inches, and afterwards secured by six stitches which were cut off at the knots. The parts having been returned, the lips of the external wound were brought together and secured by adhæsive plaister.* The animal did not appear to have suffer-

* For it was observed, that the ligature used for securing the external wound increased the inflammation very much.

ed in the least from the operation, for in less than twenty four hours he took food and has continued doing well ever since.

EXPERIMENT VI.

APRIL 16.

PLEASED with my success in the preceding experiment. I obtained another dog and opened his abdomen, in one of the small intestines, I made a longitudinal wound for about three inches, and treated it in every respect similar to that related above. This animal appeared to have suffered very little more than the other, considering the extent of the wound, for in about twenty eight hours he eat and continued doing so untill the tenth day after the operation, when he refused nourishment. Two days after he died, on examination, it was found that the wound had healed completely, but directly above the wound a bone half an inch long, and nearly as broad, was discovered to have perforated the intestine.*

* This must have been owing to a diminution of the intestinal canal which is always produced by longitudinal wounds of the intestines.

EXPERIMENT VII.

APRIL 16.

WISHING to know how much of the intestine might be removed, without much endangering the life of the animal, I performed the following experiment: having obtained a full grown dog, an incision was made into the cavity of the abdomen, two inches of one of the small intestines were removed; the divided portions were then brought together, and the wound was treated as the transverse incisions had been. In dissecting off the divided portion of intestine; some of the branches of the mesenteric arteries were wounded, but did not bleed during the operation. On visiting him in the afternoon, I found there had been a considerable hemorrhage which still continued. I did not open the wound, but applied a piece of wetted linen to the parts, which had the desired effect. On the 18th, the belly being somewhat tense, two of the external ligatures were cut away, that the blood, should any have collected, might be discharged; but the wound did not open, and the dog soon resumed the appearance of perfect

health, which continued without interruption until May 6, when he was killed. The divided portions of intestine were found united, and the ligatures had been all discharged.*

EXPERIMENT VIII.

APRIL 16.

HAVING opened the abdomen of a pointer pup, three inches of intestine were excised, the arteries being secured, the intestine in other respects, was treated as the last had been. In twenty minutes after the operation, he vomited the food which he had taken in the morning, and appeared dull the remaining part of the day. Three days after the operation, he took food, and continued doing well. May 6th, he was killed, and the abdomen being opened, it was with difficulty I could ascertain where the divison had been; the coats of the intestine appeared somewhat thickened; one of the ligatures remained attached internally.

* The viscera in this experiment appeared much more natural than in any other, probably from the hemorrhage that took place, which shews the propriety of bleeding largely in such cases.

EXPERIMENT IX.

APRIL 18.

HAVING divided the intestine of a dog transversly, I attempted to treat it in the manner spoken of by Mr. Ramdohr, viz. by introducing the upper extremity of the divided intestine within the lower; after having procured a piece of candle, as directed by him, it was inserted into that portion of intestine, which was supposed to be the uppermost. I then endeavoured to introduce the superior within the inferior, but the extremities of each became so inverted, that it was found utterly impossible to succeed, it was therefore given up and treated in the way recommended by Mr. John Bell, using only one stitch, and fastening it to the parietes of the abdomen. The dog took food the day after. On the 20th, it was observed that the fæces were discharging at the external wound, when the animal appeared very weak, but still continued to take food. On the 21st, he was much worse, and the abdomen being tense, the ligatures at the external wound were removed to facilitate the discharge of the fæces which gave a temporary relief. On the 22nd, he died. On examination there was found

a considerable quantity of fæces and water in the abdominal cavity. One portion of the intestine had united to the external wound through which part of the fæces were discharged.

EXPERIMENT X. & XI.

APRIL 28.

WISHING to give Mr. John Bell's method of stitching an intestine a fair trial, I made the following experiments: having obtained two full grown dogs, a transverse incision was made into the intestines of each of them, which was secured by one stitch and fastened to the wound. No. 10, died in about twenty-four hours. The marks of inflammation were very great, and the fæces had been discharged into the abdomen. No. 11, died on the 2nd of May. The intestines appeared very much inflamed, fæces as in the other instances were found in the abdomen, also water which the animal had drank. The large intestines appeared gangrenous and tore very easily.

EXPERIMENT XII.

A POINTER pup of about two months old was submitted to the following experiment: a triangular piece was cut out of one of the small intestines, and the wounded intestine sewn to the parietes of the abdomen. The animal very soon showed symptoms of indiposition and died in thirty hours. On examination the peritonæum and all the viscera of the abdomen were found considerably inflamed, a quantity of water was also in the cavity.

It appears then from the result of my experiments on dogs, that not only the intestine may be returned into the cavity of the abdomen, but that the ligatures may be cut off and returned with the intestine,* and that we need not be under any apprehension of their being discharged into the cavity, for by some process of the animal œconomy of which we are ignorant, the ligatures have in every instance either been discharged with the fæces or been found loosely attatched to to the internal coat of the intestine. It has been

* As was observed by Mr. Thompson of Edinburgh

said by Messrs. Cooper and Thompson, that there is a curious difference in the facility with which a longitudinal and transverse wound of the intestine unites. But in all the experiments which I have made, it was found that with care the longitudinal united as kindly as the transverse, only requiring a little more attention to the diet of the animal, which should be very sparing and liquid until the wound has had time to heal. It certainly requires more pains to close a longitudinal wound of the intestine completely, than one which is transverse. The longitudinal incision always occasions a diminution in the diameter of the intestinal canal, thereby produciug dangerous obstructions. If it should be of any considerable extent, probably the surgeon would be justified in cutting out the wounded portion and treating it as a transverse division. This may be done without much endangering the life of the animal, as appears by two experiments where three inches of the intestine were removed.

THE END.

ERRATA....Page 13, for fætid, read fœtid....16, for fœces, read fæces....In the ninth line from the bottom of the same page, read intestines for intestine.